patients (25 men and 18 women, age 54 ± 15) who underwent cardiac mass removal with the help of intraoperative TEE were reviewed. Pathological examination disclosed myxoma in 16, metastatic carcinoma in 8, thrombus in 6, fibroelastoma in 6, sarcoma in 3 and other masses in 4. Twelve patients were asymptomatic (28%), 10 presented with congestive heart failure (23%), 8 with cerebrovascular events (19%), 8 with vena cava compression syndromes (14%), 4 with chest pain (9%) and 3 with fever (7%). In 25 patients (58%), symptoms were related to the mass, while the remaining 18 patients (42%), were either asymptomatic (12.28%) or had cardiac symptoms unrelated to the mass (6.14%). The pre-bypass TEE confirmed the location and attachment site of the masses prior to cannulation and incision. In addition, based upon information obtained from the pre-bypass TEE, 1 patient (2%) underwent mitral anuloplasty because of a dilated mitral anulus, 3 patients (7%) underwent closure of a patent foramen ovale and in 1 patient (2%) the TEE helped to determine the site of inferior vena caval cannulation relative to a right atrial rhabdomyoma. Based on the post-bypass TEE, 2 patients (5%) went back on bypass for valve repair (1 mitral anuloplasty and 1 aortic valvuloplasty), because of significant regurgitation. The postbypass TEE identified small residua of large benign masses in 2 patients and reassured the surgeon regarding the completeness of surgical removal and integrity of cardiac structures. In the present patient cohort, the information from the intraoperative TEE (1) confirmed anatomical location and attachment site of the masses prior to cannulation and incision, (2) modified the planned surgical procedure in 7 cases (16%) and (3) reassured the surgeon regarding the success of the operation before the patient left the operating room in the remaining 36 cases.

916-81 Determinants of Tricuspid Regurgitation in Primary Pulmonary Hypertension

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Primary pulmonary hypertension (PPH) is often associated with functional tricuspid regurgitation (TR). However, the severity of TR varies widely from patient to patient. To determine the factors associated with severe TR, we evaluated color flow Doppler assessments of TR, two-dimensional and echocardiographic measures of right ventricular (RV) structure and function, and hemodynamic data in 81 patients with PPH. All patients had NYHA Class III or Class IV symptoms. The severity of TR was quantified as the TR/RA ratio, defined as the ratio of the maximum area of the color flow Doppler jet to right atrial area in the apical four-chamber view. TR was classified as severe when TR/RA ratio ≥0.34.

Severe TR was observed in 28 patients, 51 patients had less than severe TR, and two patients had no detectable TR. There were no significant differences between patients with and without severe TR when compared for body size, functional class, mean or systolic pulmonary artery pressure, TR peak velocity by continuous wave Doppler, or RV percent change in area (an index of RV systolic function). Patients with severe TR had greater tricuspid annular dimension (4.1 ± 0.5 vs. 3.7 ± 0.7 cm, $p < 0.05$), greater RV minor axis dimension (5.8 ± 0.7 vs. 5.3 ± 0.2 cm, $p < 0.05$), and greater ratio of the RV minor axis to RV major axis dimensions (0.80 ± 0.02 vs. 0.69 ± 0.02, $p < 0.01$).

These results suggest that functional TR is common in patients with symptomatic PPH, and that severe TR is observed primarily in patients with RV remodeling and tricuspid annular dilatation.

916-82 Quantitative Analysis of Patent Ductus Arteriosus Shunt by Transesophageal Imaging of the Flow Convergence Region

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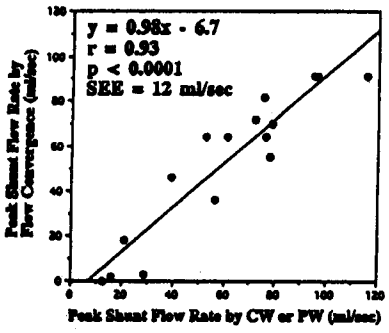
We used biplane and multiplane transesophageal echo (TEE) to develop methods to detect and quantitate patent ductus arteriosus (PDA) shunts in 26 patients with isolated PDA (age: 1 mo–37 yrs, weight: 4.0–67 kg). Flow convergence signal was a good marker for identifying the location of PDA. The maximum axial distance of the first color alias ductal flow convergence region (FCR) from the intimal line of the descending aorta was measured. Using the simple hemispherical isovelocity surface assumption, peak shunt flow (Q ml/sec) rates were calculated ($Q = 2\pi r^2 \times V$, where r (cm) = the maximal distance of the flow convergence and V (cm/sec) = the aliasing velocity used for imaging of the flow convergence). The same peak shunt flow rate was also calculated as the product of the CW or high PRF pulsed Doppler peak velocity of the shunt flow and the corresponding smallest PDA area imaged which was $\pi \times (D/2)^2$, where D = the (smallest) diameter of the ductus. Peak shunt flow rates calculated by the flow convergence method agreed well with those derived from the conventional CW or pulsed Doppler velocity-time integral. In 2 patients for whom cardiac catheterization was performed, shunt flow volumes/minute calculated by oximetry and the Fick principle agreed well with those obtained by FCR (6.3 vs. 6.0 l/min and 7.5 vs 7.1 l/min, respectively).



Conclusion: Quantitative assessment of ductal shunt flow is feasible using TEE.

917 Stress Echocardiography

Sunday, March 16, 1997, 5:00 p.m.–7:00 p.m.
Anaheim Convention Center, Hall E
Presentation Hour: 5:00 p.m.–7:00 p.m.

917-51 Dobutamine Stress Has Remained Safe and Effective Despite Use of More Aggressive Protocols: Experience with 3011 Patients

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The indications and protocol of dobutamine stress echocardiography (DbE) have evolved over 5 years of clinical use. The influence of these changes on safety and efficacy were studied in 3011 pts (age 66 ± 12 y, 3706 men). All underwent incremental Db stress from 5 to 40 μg/kg/min, followed by an additional stage of 50 μg/kg/min, handgrip and/or atropine (to 2 mg) if required. Findings were recorded at each stage and pts monitored for 6 min into recovery.

Results: DbE was performed for diagnosis of CAD in 30%, assessment of known CAD in 32%, and preoperative risk stratification in 38%. In the overall group, 85% attained target heart-rate or an ischemic endpoint; atropine was required in 30%. Dose-limiting side-effects occurred in 8%, with serious complications (ventricular tachycardia, myocardial infarction) in 0.2%. Neither ventricular fibrillation nor death occurred. Over 5 years, the use of DbE for risk stratification increased, and more aggressive protocols were used to obtain higher levels of stress but the frequency of dose-limiting side-effects was less, probably because of stricter endpoint criteria;

	1991–3	1994	1995	p
Preoperative testing	30%	37%	44%	<0.001
Proportion given atropine	13%	34%	39%	<0.001
Mean Db dose (mcg)	34 ± 9	37 ± 7	39 ± 7	<0.001
Target HR > 85% max	59%	76%	80%	<0.001
Dose-limiting side-effects	13%	7%	4%	<0.001

Conclusions: Despite use of more aggressive protocols in pts with other medical problems, Db stress remains safe and highly effective.

917-52 Clinical Significance of ST Segment Elevation During Dobutamine Stress Echocardiography: Correlation with Coronary Angiography

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Significance of ST segment elevation (ST↑) during exercise stress testing is well document. Prevalence and significance of ST↑ during dobutamine stress (DSE) echocardiography is not well documented. We found ST↑ in 28 of the 426 consecutive patients (incidence 4.4%) undergoing DSE. We prospectively examined the echocardiographic (ECHO) and angiographic correlates in these subjects. Of the 28 subjects, 19 were male and 9 were